2267

MODEL DPG-600G INSTRUCTION MANUAL

INSTRUCTION MANUAL

ROCHESTER INSTRUMENT SYSTEMS

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Rev. A

INSTRUCTION MANUAL

DPG-600G PRECISION DIGITAL PRESSURE GAUGE

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ROCHESTER INSTRUMENT SYSTEMS

WARNING

DO NOT DISCONNECT FITTING WHILE GAUGE IS UNDER PRESSURE. THE SUDDEN RELEASE OF PRESSURE MAY CAUSE RAPID MOVEMENT OF THE INLET FITTING, WHICH COULD CAUSE SERIOUS BODILY INJURY.

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CHAPTER I
GENERAL INFORMATION

1-1. INTRODUCTION.

1-2. The information contained in this Manual is for the Operation of the Rochester Instrument System's DPG600G Precision Digital Pressure Gauge.

1-3. This section contains general information concerning the DPG600G Digital Pressure Gauge. Included are instrument description, specification, supplemental characteristics, options, accessories, and other information on the instrument.

1-4. DESCRIPTION.

1-5. The RiS DPG600G is a highly accurate, hand-held, battery operated (or line-charged battery) digital instrument ideally suited for the calibration of electronic and pneumatic transmitters. Through the use of a temperature compensated piezo-resistive transducer and a monolithic successive integration A/D converter, the DPG600G achieves an accuracy of ±0.05% of Full Scale, ±1 count without sacrificing size for accuracy. Conveniently mounted on the unit in a quick connect fitting which accepts a variety of pressure tubing for pneumatic measurements; while current connections are made with conventional test leads that plug into the unit. All measurements are read via a 4½ digit, 0.4" high, LCD display.

1-6. SPECIFICATIONS.

1-7. Specifications of the DPG600G are the performance characteristics of the instrument which are warranted. These specifications are listed in Table 1-1, and are the performance standards or limits against which the instrument can be tested.

1-8. Any changes in the specifications due to design or manufacturing changes will be covered in a manual change supplement or revised manual pages. The specifications listed here supercede any previously published.

1-9. INSTRUMENT IDENTIFICATION.

1-10. Instrument identification is by serial number located on the rear panel of the instrument. Rochester Instrument Systems uses a two-part serial number. The first part (prefix) identifies a series of instruments and the last part (suffix) identifies a particular instrument within a series.

1-11. ACCESSORIES.

1-12. The DPG600G is supplied with the following:

DPG-610	120V 50/60 Hz Charger or DPG-611 220/240 V 50/60 Hz Charger
DPG-612	Carrying Case/Instruction Card
DPG-613	Test Leads
DPG-614	¼" OD Tubing Adapter

Certificate of Calibration and NBS Traceability

Table 1-1. Specifications (@ 25° C unless otherwise specified)

Model	Range	Resolution
DPG-600G-10	0 - 10.000 PSIG 0 - 199.99 in. H_2O* 200.0 - 250.0 in. H_2O*	0.001 PSIG 0.01 in. H_2O 0.1 in. H_2O
DPG-600G-10B	0 - 10.000 PSIG 0 - 650.0 mBARS	0.001 PSIG 0.1 mBAR
DPG-600G-30	0 - 19.999 PSIG* 20.00 - 30.00 PSIG* 0 - 750.0 in H_2O	0.001 PSIG 0.01 PSIG 0.1 in. H_2O
DPG-600G-30B	0 - 19.999 PSIG* 0 - 1999.9 mBAR	0.001 PSIG 0.1 mBAR
DPG-600G-100	0 - 100.00 PSIG 0 - 1999.9 in H_2O* 2000 - 2500 in. H_2O*	0.01 PSIG 0.1 in. H_2O 1.0 in. H_2O
DPG-600G-100B	0 - 100.00 PSIG 0 - 6500 mBARS	0.01 PSIG 1.0 mBAR
All models	0 - 19.999 mAdc* 20.00 - 100.00 mAdc*	0.001 mAdc 0.01 mAdc

*All multiple ranges are autoranging

NOTES:
INCHES OF WATER COLUMN AT 20°C (68°F [ISA STANDARD]

Input Connection: ¼" O.D. Tube Quick Connect, Std.

No tools required. Can be used with nylon, polyethylene and soft metal tubing. Consult factory for other options.

Input Maximum overrange: 2 × Rated Pressure

Burst Pressure: 3 × full scale rating

Vacuum Capability Without Recalibration: −1 × Rated Pressure or Absolute Vacuum, whichever is closer to atmospheric pressure.

Response Time: 0 - fullscale 1 sec. maximum

Control: Thumbwheel potentiometer for "zero" (pressure only).

Ambient Operating Temperature Range: 30 - 130°F (−1° to 54°C)

Storage Temperature: 0 - 150°F (−18 to 65°C)

Sensor Type: solid-state piezoresistive strain gauge

Media Compatability: Suitable for clean and dry instrument air and other non-corrosive, non-conductive gases and liquids (consult factory).

Display: 4½ Digital, 0.4" high numerals with Auto-Ranging, polarity and low battery indication.

Storage and Shipping Temperature Range: 0° -150°F (−18° to 65°C)

Power:

a. Internal rechargeable nickel cadmium battery pack
b. Battery operating time: 6 hrs. @ 25°C
c. Charge time: 14 hrs
d. 120 Vac or 220-240 Vac 50/60 Hz; simultaneously operate and charge (120v or 230v must be specified at time of purchase)

Case Size: 3.75" (95.3 mm) Wide × 6.50" (165.1 mm) Long × 2.25" (57.2 mm) High

Standard Accessories:

(1) Custom Carrying Case
(2) Pressure Conversion Reference Card
(3) ¼ inch O.D. Tube Quick Connect

Optional Accessories

(1) DPG-614 Additional ¼ inch O.D. Tube Quick Connect.
(2) DPG-615 Portable (1 lb) pressure pump with vernier pressure adjustment for onsite calibration (0-60 PSI).

Autoranging Characteristics

Autoranging automatically selects the reading's optimum range. Upranging occurs at 100% of the lower range, and downranging occurs at 50% of the lower range.

Accuracy Error: (Includes combined effect of hysteresis, linearity and repeatability).

TYPE	RANGE	MAX ERROR
Pressure	ALL	±0.05% of F.S. ± one count (10 minutes after turn on and after zeroing)
Current	20.00 - 100.0 mA 0 - 19.999 mA	±0.05% of F.S. ± one count ±0.05% of F.S. ± one count

Temperature Coefficient:

Pressure	±0.25% of F.S. maximum 30° to 130°F (−1° to 54°C)
Current	±0.25% of F.S. maximum 30° to 130°F (−1° to 54°C)

CHAPTER II
INSTALLATION

2-1. INTRODUCTION

2.2 This section of the manual contains the necessary information to install the DPG600G. Included are initial inspection procedures, environmental information, and instructions for repacking the instrument for shipment.

2-3. INITIAL INSPECTION

2-4. This instrument was carefully inspected before shipment. It should be free of mars and scratches and in perfect electrical order upon receipt. This instrument should be inspected for any damage that may have occurred in transit. If the shipping container or cushioning material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the instrument has been mechanically and electrically checked. If there is mechanical damage, or the contents are incomplete, or the instrument does not pass a performance test, notify Rochester Instrument Systems. If the shipping container is damaged, or the cushioning material shows signs of stress, notify the carrier as well as RiS. Save the shipping materials for the carriers inspection.

NOTE

To contact RIS Customer Service Department, call the appropriate phone number listed on the Factory Repair and Return Sheet located at the end of the manual.

2-5. PREPARATION FOR USE.

2-6. The DPG600G Digital Pressure Gauge has been shipped with a fully charged battery pack, and should be ready for use upon opening the shipping container. The battery charger requires a power source of 120 Vac (±10%, 50/60 Hz) or 230 Vac (±15%, 50/60 Hz) standard.

2-7. ENVIRONMENTAL REQUIREMENTS.

2-8. OPERATING AND STORAGE TEMPERATURE.

2-9. In order to meet and maintain the specifications listed in Table 1-1, the DPG600G should be operated within an ambient temperature range of +30° to +130°F (−1° to 54°C).

2-10. The DPG600G may be stored or shipped within an ambient temperature range of 0° to 150°F (−18° to 65°C).

2-11. REPACKAGING FOR SHIPMENT.

2-12. If the instrument is to be shipped to Rochester Instrument Systems for service or repair, attach a tag to the instrument identifying the owner and indicating the service or repair to be made. Include the model number and full serial number of the instrument. In any correspondence, identify the instrument by model number and full serial number.

2-13. Place the instrument in original container with appropriate packaging material and secure with strong tape.

2-14. If the original container is not to be used, do the following:

1. Wrap the instrument in heavy plastic before placing in an inner container.
2. Place packing material around all sides of

   with cardboard strips.
3. Place the instrument in the inner container in a heavy carton and seal with strong tape.
4. Mark shipping container **"DELICATE INSTRUMENT", "FRAGILE",** etc.

CHAPTER III
OPERATION

3-1. INTRODUCTION

3-2. This is the information and instructions for the operation of the DPG600G Digital Pressure Gauge.

3-3. GENERAL OPERATING CHARACTERISTICS.

3-4. AC Operation.

3-5. The DPG-600G may be operated on AC line voltage by plugging in the battery charger. However, the battery will charge at a slower rate because the charger is also supplying current to operate the DPG-600G. The battery cannot be fully charged in this mode of operation.

3-6. Battery Operation

3-7. A fully-charged battery pack will supply 6 - 8 hours of accurate operation at 25°C. When the battery voltage drops below a predetermined level, a Low Battery indication "B" will appear on the left side of the display. Readings will be within rated accuracy for approximately ten minutes after the "B" appears on the display.

3-8. To recharge the battery, connect the charger plug to the jack on the right rear of the instrument and plug the charger into an AC power source (117 VAC ±10%, Std; 230 VAC ±15% Opt.). The External charger will charge the internal battery in 14 to 16 hours with the power *off*. Since the battery charger is a constant current type, it cannot damage the batteries if left on continuously. However, continuous charging is not recommended since it will usually shorten battery life.

3-9. Turn-on and Warm-Up

3-10. Turn the instrument on and allow at least 10 minutes for initial stabilization.

3-11. CONTROLS AND INDICATORS

3-12. The operator selects the desired mode of operation via the Mode Select Switch located on the face plate. Table 3-1 indicates the switch positions and functions of the Mode Selection Switch.

3-13. When a pressure measurement is selected via the Mode Selection Switch, the thumbwheel, located on the side of the unit, is to be used to "zero" the display with zero input pressure. Then apply pressure signal to be measured.

3-14. The LCD will display all measurements in the appropriate units, and indicate Low Batteries with a "B".

3-15. PNEUMATIC CONNECTOR

3-16. The pneumatic input signal is connected to the ¼" O.D. Quick Connect fitting supplied with the unit.

NOTE

To prevent damage to the pressure transducer, refer to the instruments pressure range as stated on the front panel of the unit. Do not apply more than 2 times rated pressure, or the pressure sensor may be damaged!

3-17. CURRENT PROBE INPUT JACKS

3-18. When a current measurement is selected, insert the probes into the jacks located at the rear of the instrument to make the measurement.

Position	Standard	Optional
Pos. 1 (left)	INCHES OF WATER	BARS
Pos. 2 (middle)	Milliamps	Milliamps
Pos. 3 (right)	PSIG	PSIG

Table 3-1 Mode Selection

CHAPTER IV
CALIBRATION

4-1. INTRODUCTION

4-2. This section contains the information for troubleshooting and checking the calibration of the instrument.

4-3. Pneumatic Calibration Check Procedure:

4-4. Equipment required:

1. Precision Manometer/Controller ±0.015%; Mensor 10205-001 or equivalent

4-5. Perform the following steps:

a. Turn the instrument on and allow 10 minutes for warm-up.

b. Select the appropriate mode, and with no pressure applied, zero the DPG-600G using the side access thumbwheel.

c. Apply 25, 50, 75, and 100% of scale pressures and record the results obtained.

d. If results indicate an error exceeding ±0.05% F.S. refer to the Field Calibration Dwg. A-1056-879.

4-6. Milliamp Calibration Check Procedure:

4-7. Equipment required:

1. Precision Current Source +0.01%; EDC Model 103 or equivalent

4-8. Perform the following:

a. The milliamp mode may be checked by connecting the precision current source to the milliamp jacks. With zero input current, the display should indicate 0.000 ± 1 count - failure to do so indicates a potential problem. Apply 19.900 milliamps and record the results. If results obtained exceed ±0.075% F.S., refer to the Field Calibration Dwg. A-1056-879.

4-9. CIRCUIT OPERATION

4-10. Basically, the DPG-600G is a 4½ digit DVM which can be connected to a solid state pressure sensor for pressure measurement or to a precision shunt for current measurement. For stability, the pressure sensor incorporates a unique temperature compensation technique. Note that a malfunction in the pressure sensor circuit should not affect operation of the milliamp circuit.

CHAPTER V
TROUBLESHOOTING

5-1. INTRODUCTION

5-2. If a malfunction is observed, proceed to troubleshoot as with any other electronic circuit. Problems can usually be classed as gross malfunctions such as no display, or as calibration problems where the limit of error observed exceeds the specifications. Table 5-1, Troubleshooting Guide and Figure 5-1, Component Layout, are included to assist in the location of malfunctions.

TABLE 5-1
TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE
Blank display	Battery pack discharged, or not connected; defective ON/OFF switch; defective op amp U10.
Display segments missing	Defective display connector; defective DSP1, U8.
Double decimal pt. or decimal missing or out of place	Jumpers not set correctly on DISPLAY BD; defective IC on DISPLAY BD; defective U8.
No response on pressure. (milliamps ok)	Defective U6, U7, SW2, or Pressure sensor.
No response on milliamps. (pressure ok)	Blown fuse F1, SW2 defective; broken test lead.
Out of calibration on pressure and milliamps.	1 volt reference mis-adjusted or defective. Refer to Field Calibration procedure.
No response to zero adjust	Defective U7, U9, or RP3

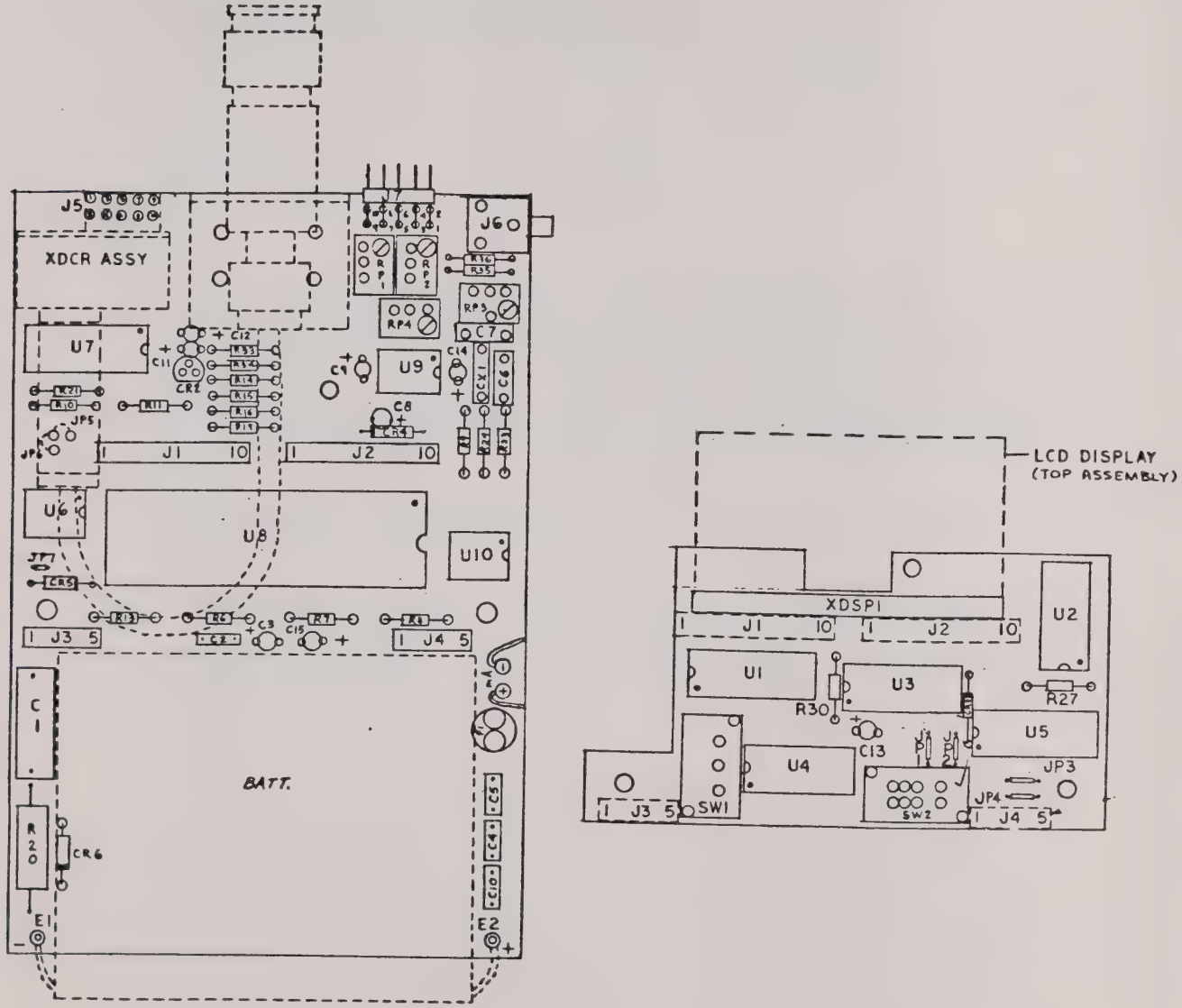

FIGURE 5-1 COMPONENT LAYOUT

FIELD CALIBRATION PROCEDURE
DPG-600 Digital Pressure Gauge

1. Equipment Required

   A. Precision Source of Pressure
   Accuracy ±.015% Stability ±.0075%
   (Mensor 1020S-001 or equivalent)

   ⇒ ±.00225 ≈ 3 digits either way

   B. Precision Current Source

   Accuracy ±.01% Stability ±.005%
   (EDC Model 103 or equivalent)

2. Setup

   A. Remove 4 screws from base of unit and remove cover by first raising left edge about ½ inch. Hold the circuit board in the base of the unit and continue to raise the left side of the case until it clears the sensor assembly and the right side of the case clears the thumbwheel adjustment knob. Do not apply excessive force on the thumbwheel. Carefully free the current input wires from under the display board and set the unit on a flat surface.

   B. Plug in the battery charger, and allow the batteries to charge for at least 4 hours.

   C. Turn on the unit and allow to stabilize for at least 1 hour.

   D. Unplug the charger before proceeding with the remaining steps of this procedure.

REV.	DESCRIPTION	CHK.
A	NEW RELEASE	

REVISIONS

ROCHESTER INSTRUMENT SYSTEMS
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MAXIM RD., CRAYFORD, DARTFORD, KENT DA1 4BB, U.K.

TITLE: Field Calibration Procedure
DPG-600 Digital Pressure Gauge

DRAWN	CHECKED	DRAWING NO.	REV.
	KM 9/5	A-1056-879	A

APPR.

SHEET 1 OF 4

2. Current Calibration

A. Set SW2 for milliamp range (center position) and apply +100.00 mA. Observe proper polarity.

B. Adjust pot RP4 (refer to Figure 1) until the display reads 100.00 (-1, +2 counts).

C. Apply 19.900 mA. Verify that the display reads 19.900 (±10 counts). If display does not indicate to within specified accuracy, refer to step 8 of this procedure.

4. PSI Calibration

A. Connect pressure source to pressure input.

B. Set SW2 for PSI range (far right).

C. With 0 PSI input, adjust zero thumbwheel (RP3) for a display reading of 0.000 (±1 count)

D. Apply full scale PSI and adjust RP2 for full scale reading. The allowable count deviation varies with the full scale calibration of the device, but should not exceed ±.03% ±1 count.

OR 19.990 - TO GET THE THIRD DIGIT FOR ACCURACY

E. Repeat steps 4.C and 4.D until no further adjustment is needed.

F. Apply midscale pressure input to within ±.03%. Verify the display reads within ±.05% of its full scale reading ±1 count. If display does not indicate to within specified accuracy, refer to step 8 of this procedure.

5. IN H_2O Calibration (if equipped)

A. Set SW2 for IN H_2O range (far left).

B. With 0 IN H_2O input, adjust zero thumbwheel (RP3) for a display reading of 000.0 (decimal point location may vary depending on full scale calibration).

C. Apply full scale in H_2O and adjust RP1 for full scale reading. The allowable count deviation varies with the full scale calibration of the device, but should not exceed ±.03% ±1 count.

D. Repeat steps 5B and 5C until no further adjustment is needed.

6. Milli Bar Calibration (if equipped)

A. Set SW2 for mBar Range (far left).

B. With 0 mBar input, adjust zero thumbwheel (RP3) for a display reading of 000.0 (decimal point location may vary depending on full scale calibration).

C. Apply full scale mBar and adjust RP1 for full scale reading. The allowable count deviation varies with the full scale calibration of the device, but should not exceed ±.03% ±1 count.

D. Repeat steps 6B and 6C until no further adjustment is needed.

7. Reassembly

A. Disconnect all external hoses and wires connected to the Unit Under Test.

B. Set switch S1 to OFF (down).

C. Tuck current input wires under display board and route away from thumbwheel.

D. Replace cover, starting with right side. Gently guide the thumbwheel through the slot in the cover.

E. Lower left side of cover until contact is made with sensor assembly. Insure that thumbwheel is properly located through case.

F. Guide case over sensor and snap shut. Reinstall screws in case (longer screws in display end of case). DO NOT OVER-TIGHTEN!

8. Non-Complying Unit

If unit does not meet the specifications required by this procedure, or cannot be calibrated to within the specified accuracy, call the appropriate phone number listed on the Factory Repair and Return Sheet contained in the Instruction Manual (A-1055-573).